AMENDMENTS TO THE SPECIFICATION

On page 7 of the original application, lines 8-15 should be replaced with

~~FIGURE 5 presents a micrograph of the mask used in the first reduction to practice.~~

FIGURES ~~6a – 6b~~ 5(a) – 5(d) present measurement results that confirm ~~the~~ that a film has been transferred using this invention.

FIGURE ~~7~~ 6 presents a micrograph of a transferred structure after development.

FIGURES ~~8a – 8b~~ 7(a) – 7(b) illustrate a second reduction to practice for the invention.

FIGURES ~~9a-9c~~ 8(a) – 8(c) illustrate details of a third reduction to practice for the invention.

FIGURES ~~10a – 10c~~ 9(a) – 9(c) illustrate details of a fourth reduction to practice for the invention.

On page 15 of the original application, lines 16-21 should be replaced with the following paragraphs:

To demonstrate Molecular Transfer Lithography, the following experimental processes were carried out. These are also illustrated in FIGURES 4 through ~~10~~ 9.

For the first reduction to practice, illustrated in ~~figure~~ FIGURE 4, the carrier ~~substrate~~ 201 was a quartz ~~substrate~~ sheet 0.5 mm thick and 25 mm by 25 mm in area. This was coated with Shipley 310i negative photoresist 230 using spin coating at 4000 rpm. Because this material had a suitable surface energy, no additional removal layer 215 was required.

On page 16 of the original application, lines 3-11 should be replaced with the following paragraph:

The photoresist was exposed using contact lithography with a mask and flood exposure from a 1 kW Hg(Xe) Arc lamp. ~~An image of the mask structures taken from an optical microscope at 20X magnification is shown in FIGURE 5.~~ The arc lamp was filtered, so only UV light with wavelengths of 220 – 250 nm exposed the photoresist. The exposure time was 1 second using an Oriel lamp, Model number 66921 which utilizes a UV grade fused silica F/1 condenser. The substrate 200 for this demonstration was a silicon wafer, coated with the adhesion layer. For this example, the adhesive layer 225 was a monomolecular HMDS layer, placed on the surface by standard vapor priming techniques This typically produces a monolayer of the HMDS on the surface.

On page 16 of the original application, lines 20-23 were originally amended on April 4, 2002. The amended text should be further amended to read as follows:

In FIGURE ~~6~~ 5, we depict the measurement of the thin imaged layer of photoresist taken by a spectrometer before and after the transfer. The presence of interference fringes indicates the presence of a thin film. The original spectrum in FIGURE ~~6(a)~~ 5(a) indicates a film is present on the original quartz carrier, while FIGURE ~~6(b)~~ 5(b) indicates no film is found on the silicon substrate. After transfer, the spectrum in FIGURE ~~6(c)~~ 5(c) indicates there is no film left on the quartz carrier, while the spectrum in FIGURE ~~6(d)~~ 5(d) indicates the presence of the film on the silicon substrate.

On page 17 of the original application, lines 1-2 should be replaced with the following:

In FIGURE ~~7~~ 6, we show an image of the developed photoresist on the ~~substtrate~~, substrate taken using an optical microscope with a 50X magnification lens.

On page 17 of the original application, lines 3-23 should be replaced with the following:

For the second reduction to practice, as illustrated in FIGURE ~~8~~ 7, a quartz plate and a silicon wafer were again used as the carrier 201 and substrate 200, respectively. After the silicon had been primed with HMDS, however, an additional layer of Shipley 310i photoresist 835 was coated onto the substrate at 4000 rpm using standard spin-coating procedures. The thickness of the photoresist film at this spin-speed is roughly 550 nm. The quartz carrier was exposed using the same conditions as those mentioned in the first reduction to practice. The carrier containing the latent image within its own layer of Shipley 310i photoresist was then brought into contact with the substrate coated with HMDS and Shipley 310i. The combined carrier and substrate were then heated to 110C using an enclosed chamber. The quartz carrier was then removed from the wafer. With this method, the transfer occurred within the exposed Shipley 310i, as film remained on the substrate after removal; however the imaged material also was observed on the carrier. This observation indicates a lateral separation within the exposed material , causing it to split. This results in a portion on the wafer and a portion on the quartz carrier itself. The advantage of this method is improved wetting at the substrate and carrier interface, as well as smaller disassociation force required. This method may also be useful for top surface imaging strategies, such as silylation based techniques, of transferring images.

For a third reduction to practice, as illustrated in FIGURE ~~9~~ 8, a quartz plate with a layer of Shipley 310i was again used as the carrier 201 and photosensitive layer 230 the latent image formed by exposure for 1.0 seconds using the Oriel exposure system

On page 18 of the original application, lines 1-12 should be replaced with

previously described. A silicon wafer primed with HMDS was used as the substrate 200. After the silicon had been primed with HMDS, however, an additional layer 935 of Shipley UVN2 photoresist 530 nm thick was added to the substrate by standard spin coating techniques. The quartz carrier containing the latent image within Shipley 310i was then brought into contact with the UVN2 coated substrate. The two adhered structures were then exposed to UV light 950 at wavelengths from 220nm to 250nm for 2 seconds as illustrated in FIGURE ~~9c~~ 8(c). The exposure was performed through the back of the quartz carrier 201. The structures were then heated to 110C on a conventional hotplate. This results in cross-linking of the material with diffusion across the interface of the imaged material and the UVN2 photoresist on the substrate. After heating the carrier was removed by applying a lateral force to induce a disassociation within the latent image film.

On page 18 of the original application, lines 13-23 should be replaced with

For the fourth reduction to practice, illustrated in FIGURE ~~10~~ 9, a modified quartz carrier 1001 containing capillary channels 1010 was used as the carrier. This carrier was first coated with an adhesion layer 215 made up of Shipley 3612, a positive photoresist, using spin coating at 4000 rpm to produce a film thickness of 1.7 microns. This was then and was then uniformly exposed to UV radiation at wavelengths from 220-250 nm for 10 seconds. This degraded the photosensitivity of the photoresist and reduced the molecular weight. The quartz carrier with 3612 resist was then baked at 120C for 4 minutes. A photosensitive layer 230 of Shipley 310i was then spin coated at 4000 rpm onto the hardened exposed 3612 photoresist. The photosensitive 310i layer was then imaged using a contact lithography procedure, as described above. This carrier was then brought into contact with the silicon substrate. As in the third reduction to practice, above, the